Using Environmental Management Systems to Improve Environmental Performance and Lower Operating Costs

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Outline

- Why Camden Implemented EMS
- How the EMS was Implemented
- What Benefits were Gained

Camden County Municipal Utilities Authority (CCMUA)

- Services 500,000 customers in Southern New Jersey
- Design Flow: 80 MGD
- Average Flow: 58 MGD
- Secondary, pure oxygen activated sludge treatment
- Discharges to Delaware River

Goals

CCMUA has three fundamental goals that are critical to its success:

- Optimization of Water Quality Performance
- Optimization of Air Quality Performance
- Cost Minimization

Initial Conditions

- CCMUA obliged to raise rates by 22½%, from $275 per household to $337
- Numerous odor complaints from neighboring residents
- Plant struggling to meet state discharge limits, despite receiving only 70% of rated capacity

Environmental Management Systems

- Help an organization identify its environmental performance goals
- Harness and direct the organization's collective wherewithal toward meeting performance goals

Implementation of EMS

Identification of Core Corporate Objectives

- Optimization of Water Quality Performance
- Optimization of Odor Control Performance
- Cost Minimization

Identification of Core Goals assures sufficient allocation of necessary resources

EMS Development Steps

- Gap Analysis
- Team Chartering
- Awareness Training
- Environmental Policy
- EMS Manual Development
- Sustained Implementation

Gap Analysis

- Identify each critical process and…
- Identify the gaps between current performance levels and desired levels

Team Chartering & Awareness Training

- EMS Team composed of top management, ensuring corporate buy-in at highest levels of organization
- High level EMS champion an absolute necessity
- Core Corporate Goals Communicated from top management down to line workers
- Specific technical experience communicated from line workers back up to top management to ensure capture of all potential improvement opportunities

EMS Implementation

- Environmental Policy distributed to all employees
- Regular meetings of implementation team
  - Identify potential cost savings and renew enhancement opportunities
  - Identify ways to improve water quality and odor control performance
- Performance targets clearly articulated to all levels of staff
- Operational problems to be reported immediately to top management

How was the EMS Developed?

- The EMS was built using EXISTING Management System Components
  - Operation and maintenance procedures
  - Emergency response plan
  - Spill prevention plan, etc
- EMS harnesses EXISTING wherewithal and systematically directs it toward meeting performance goals

How was the EMS Developed?(cont.)

- Identify goals
- Identify “critical control points”
  - Key factors that have an impact on the goals
- Systematically ensure that critical control points are properly prioritized and managed
- Strive for continual improvement

Pre-EMS State of Affairs

Water Quality

- Plant struggling to meet 30 ppm permit limit for suspended solids (TSS) and Biochemical oxygen demand (BOD)
- 24 unauthorized plant bypasses in 1999 alone

Air Quality

- 16 NJDEP Odor control violations from April 1997 – June 1998
- Numerous odor complaints from neighborhood; relations openly hostile
- $8 million in aggregate fines

Key Improvement Initiatives

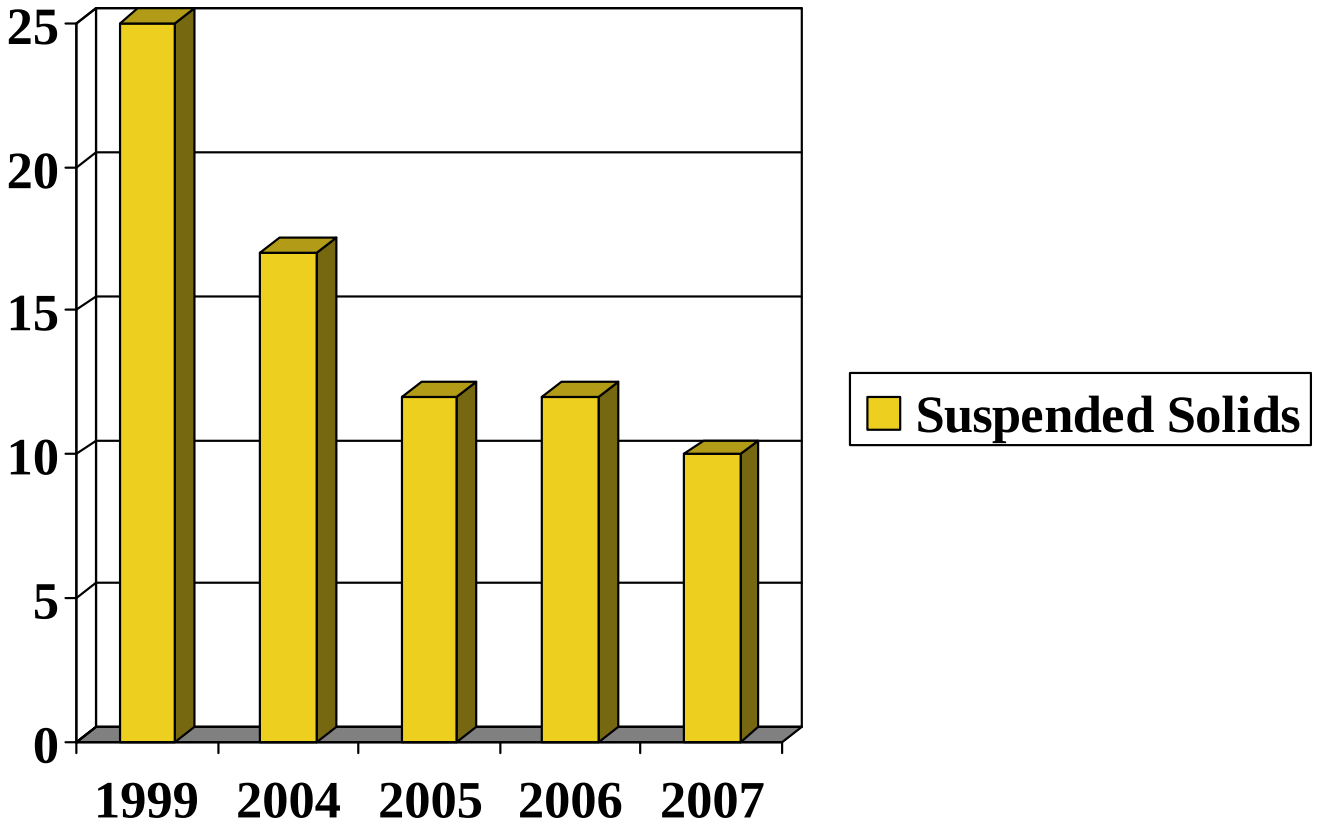
Water Quality

- Decided that merely meeting permit was unacceptable; effluent quality should be optimized
- Required that all systems must be maintained and kept in service
- Installed new sludge thickening and dewatering facilities to improve plant's sludge removal capability
- Plant bypasses no longer permitted without express NJDEP approval

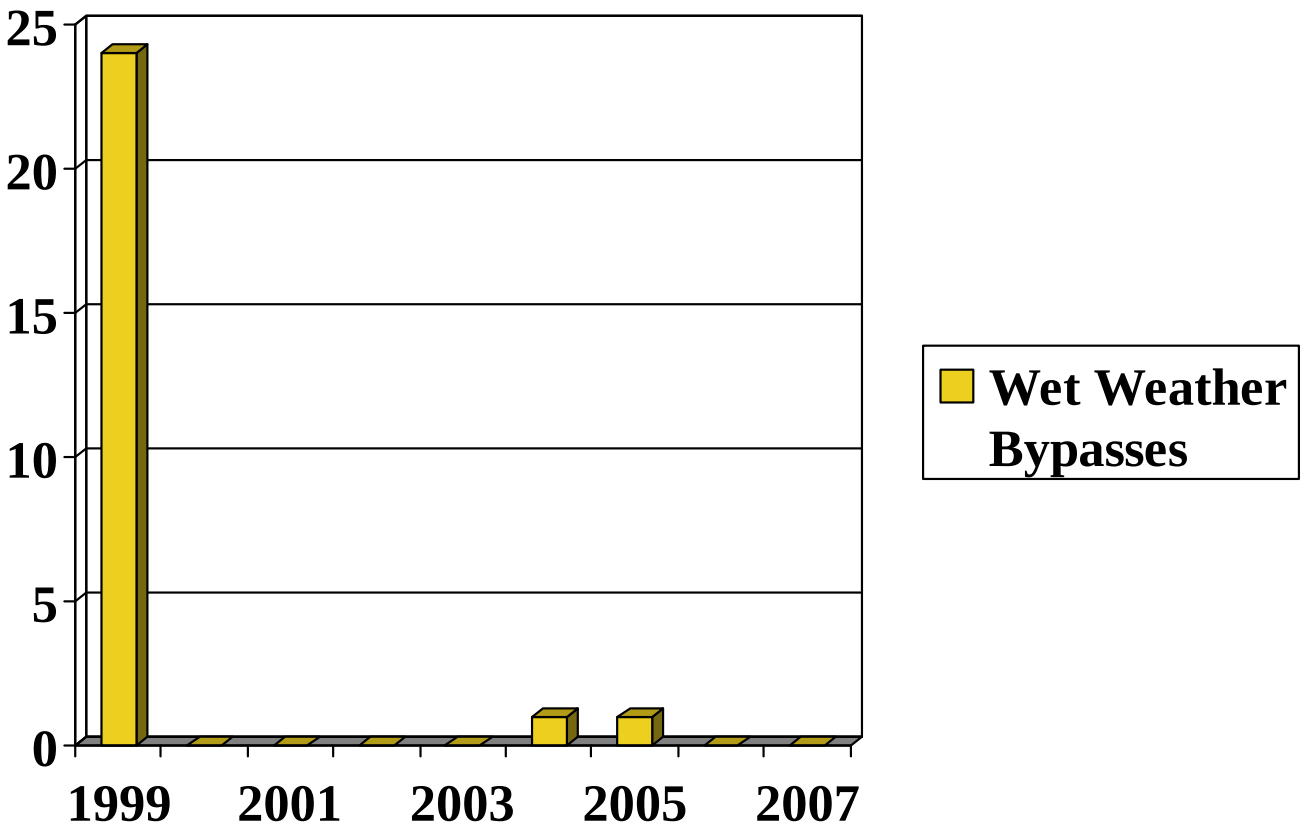
Results – Effluent Quality Improvement

- Improved effluent quality by 40-50%
  - 22ppm TSS in 1999 to 10ppm in 2007
  - 25ppm BOD in 1999 to 15ppm in 2007
- Increased TSS and BOD removal
  - TSS: 88% in 1999 to 95% in 2007
  - BOD: 85% in 1999 to 95% in 2007
- Reduced wet Weather Bypasses from 24 in 1999 to 2 from 2000 - 2007

Goal: Optimize Water Quality Performance



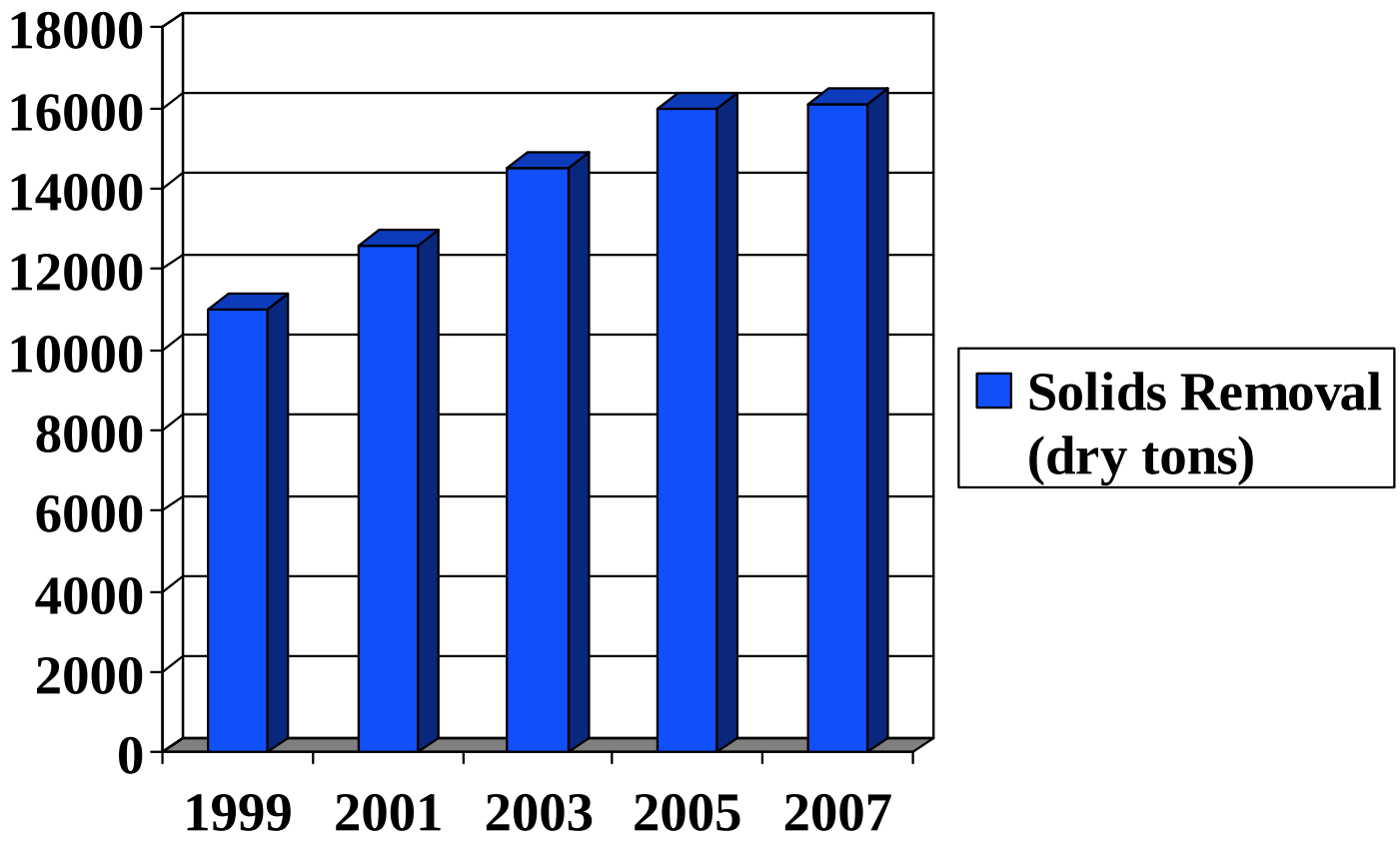
Goal: Optimize Water Quality Performance



Results – Effluent Quality Improvement

- Increased sludge removal by 45%
  - From 11,000 dry tons removed in 1999 to 16,000 dry tons in 2007
- Increased sludge cake % solids by 27%
  - From 22% in 1999 to 28% in 2007
- Reduced sludge volume for final disposal.

Goal: Optimize Water Quality Performance



Key Improvement Initiatives (cont.)

Air Quality

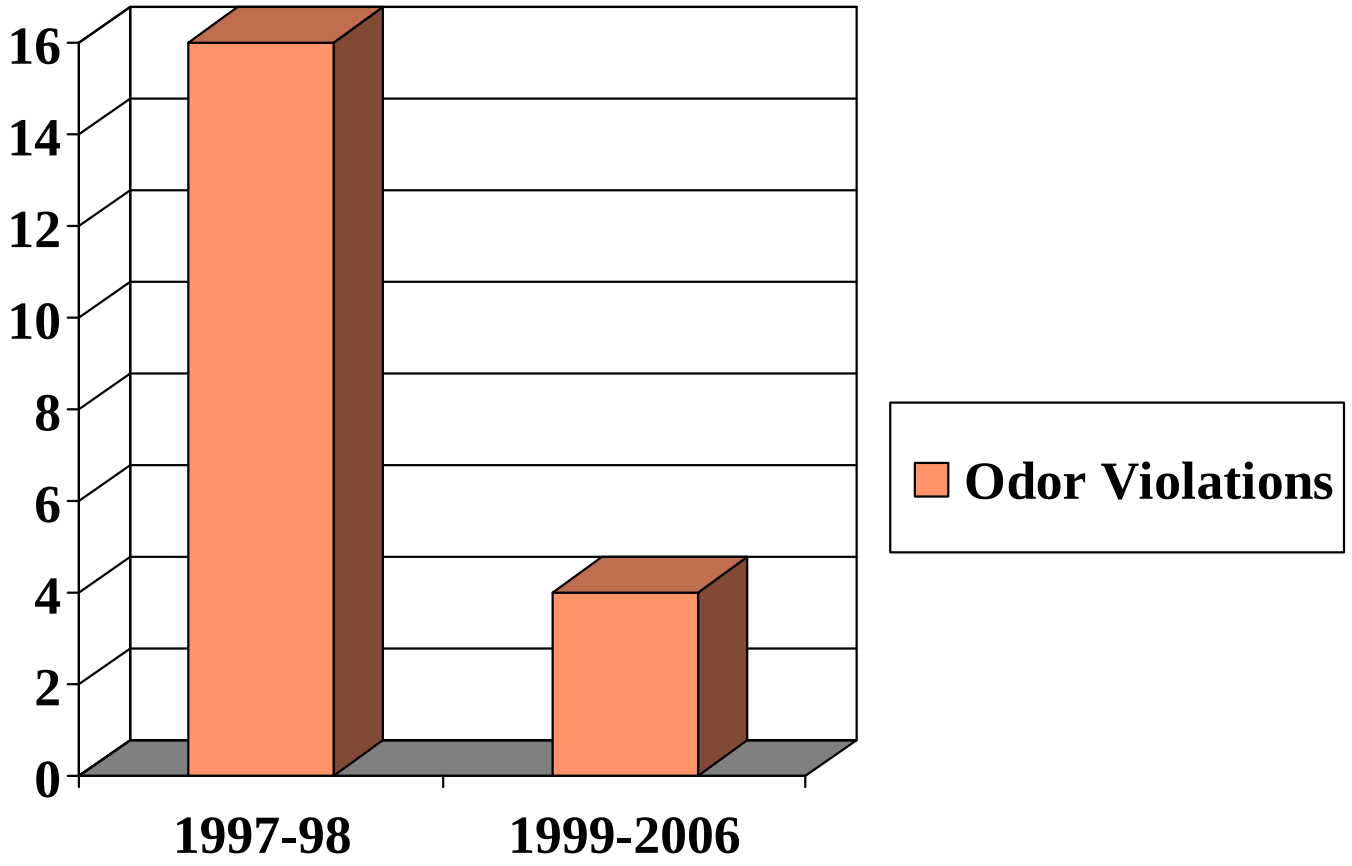
- Closed odorous sludge composting facilities
- Odor inventory by independent consultant
- Installed new odor control systems at plant headworks
- Imposed zero tolerance policy with respect to odors from carelessness (doors left open; odor systems left off, etc)
- Numerous outreach attempts to neighboring community to improve relationship

Results – Odor Control Improvement

- Odor violations and fines down from 16 in 1997/1998 (14 month period) to 3 from April 1998 to June 2006
- Odor complaints down by over 90%
- Friendship forged with neighborhood due to sincere and successful efforts to reduce odors

  (In addition CCMUA undertook several other positive initiatives, like building two parks in the neighborhood, etc.)

Goal: Optimize Air Quality Performance



Result: Risk Avoidance

- Improved performance reduces risk of adverse impact to the environment and public health
- Improved water quality and air quality performance reduces risk of fines and violations from regulatory agencies
- Improved odor control performance reduces risks of lawsuits and complaints from the public

Result: Improved Relations with Regulatory Agencies & Neighbors

- Positive actions toward improving water quality and air quality performance correspondingly improves relations with regulatory agencies
- Positive actions toward eliminating odors, plus general good neighbor policy, correspondingly improves relations with neighborhood

Result: Positive Environmental Culture

- An effective two way chain of communication between top management and line workers was established to ensure that workers know management's performance goals and that management knows what workers need to achieve these goals

Result: Capture of Institutional Knowledge

- Documenting standard operating procedures captures key knowledge held by experienced personal
- Cushions the blow when key personnel depart and reduces the subsequent learning curve time.

Cost Impacts of Environmental Improvement

- Did improved environmental performance result in cost increases or rate increases?

  NO!

- EMS team managers were directed not to choose between performance improvements and cost savings, but rather to look for initiatives that would both improve performance and reduce costs

Cost Impacts (cont.)

- In fact, the CCMUA achieved a 25% reduction in operations and maintenance costs
  - From $21.2 million in 1996 to $16 million in 2000
- This, combined with additional efforts to capture under reported revenue, resulted in …
  - User rate held for 12 years, 1996-2007, with three rate cuts during this period

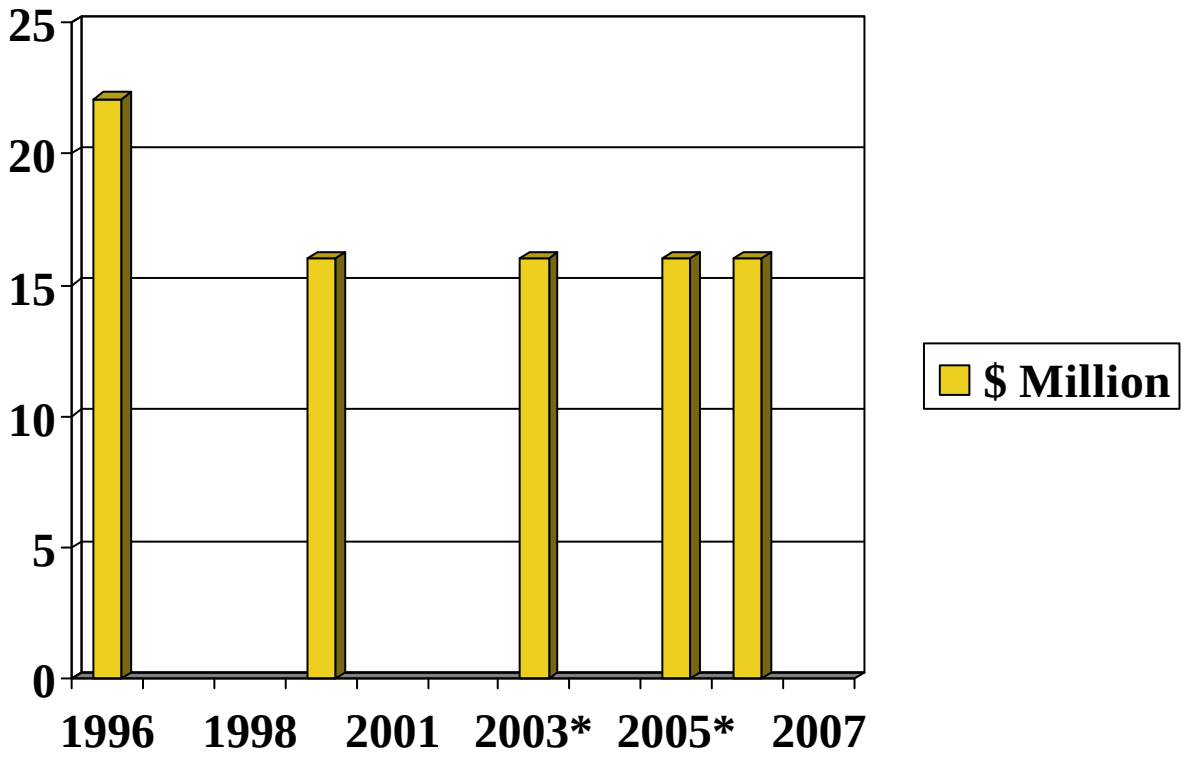
Achieving efficiencies in operations can, and did, result in improved operational performance and cost savings

Cost Impact of Environmental Improvement (cont.)

- While purchase of new sludge dewatering equipment added to annual debt service payments, these increases were more than offset by maintenance cost savings
- While additional capture of solids resulted in more dry tons to treat, improved dewatering performance resulted in minimal change in wet tons to dispose
- Elimination of sludge composting facility not only reduced odors, but a more cost-effective disposal option was found as a replacement
- Improvement of plant performance enabled CCMUA to use plant's spare treatment capacity to accept outside septage $\Rightarrow$ revenue

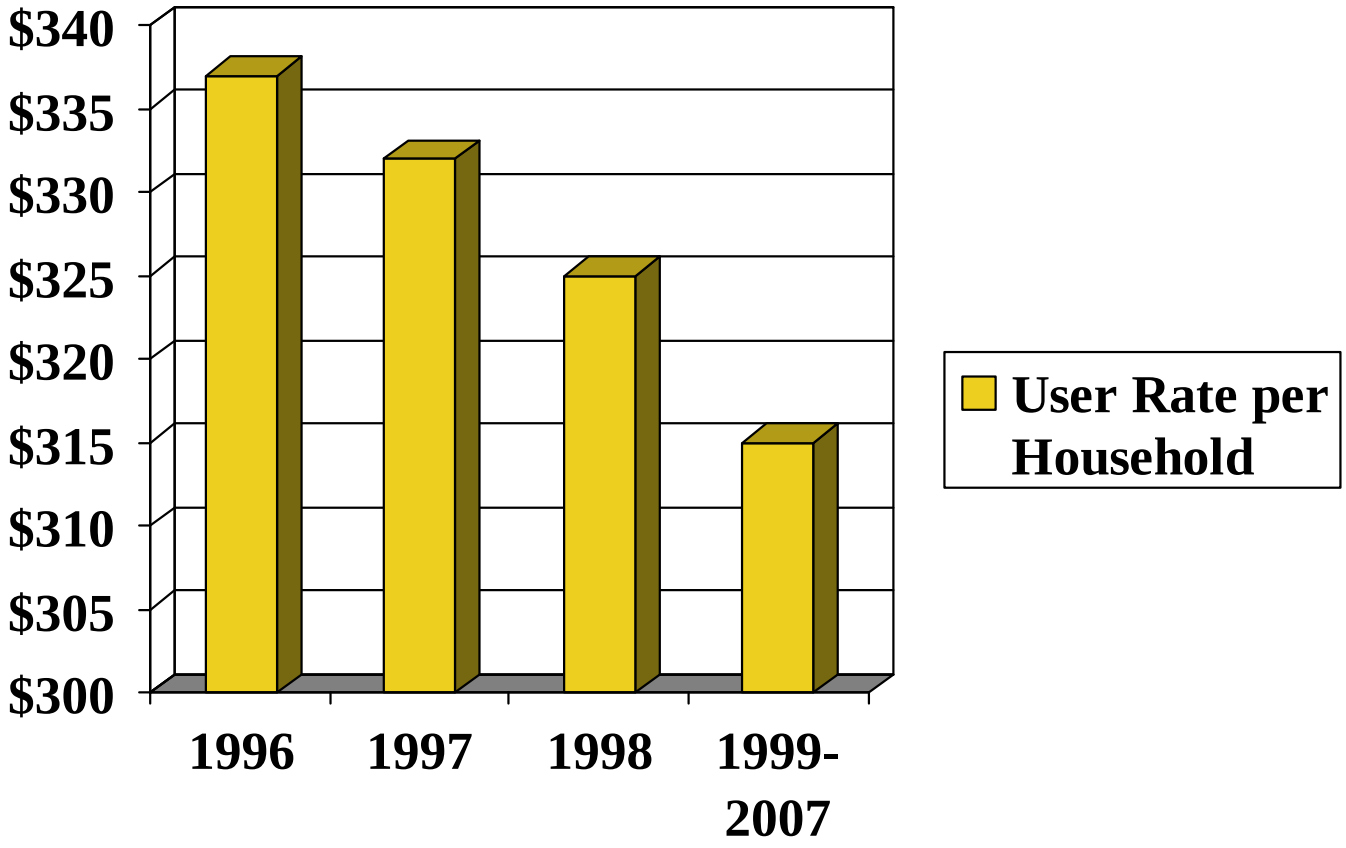
Goal: Minimize Cost

- Annual Operating Cost Reduced



* Adjusted for inflation

CCMUA User rate



Keys to Achieving Cost Savings

- Continually solicit ideas / Strive for continual improvement
- Select best opportunities
- Follow-up, follow-up, follow-up!

Asset Management – A Key to Success

- Effective asset management was the single biggest factor in achieving both improvement in environmental performance and cost reductions
- Specifically, identifying and replacing underperforming process units:
  - Always improved environmental performance
  - Nearly always resulted in operation cost savings that equaled or exceeded debt service costs

Public & Private Sectors… Really Not So Different

Private Utility	Public Utility
Maximize Profit	Minimize Cost
Optimize Product Quality	Optimize Environmental Performance
Serve Customers	Serve Ratepayers, and Environment
Outside Competition	Privatization or replacement

Benefits of EMS

- EMS provided the structural framework:
  - To harness the company's internal capabilities
  - Organize it, and
  - Then direct it in an unified manner to address the organization's top priority objectives
- EMS ensures that:
  - Top goals are continually given top priority, at all levels of the operation, top to bottom
  - Ideas are followed up on, until they are implemented

EMS Benefits Available to All

- EMS resulted in improved efficiency which led to both improvement in environmental performance and significant cost savings as well
- CCMUA achieved significant improvements through EMS even though:
  - It was an average, borderline compliant, utility prior to EMS
  - Camden City is the poorest city in the nation

Conclusions

- EMS is a very valuable tool to facilitate maximal improvement and achievement of core organizational objectives
- Achieving improved efficiencies can, and did, not only result in improvement in environmental performance, but also cost savings as well

Conclusion (cont.)

- EMS is the centerpiece of the CCMUA's firm commitment to optimize the performance of its wastewater treatment plant, and to provide quality service to its ratepayers at the lowest possible cost.

Thanks for Listening!

If you would like more information, please contact:

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